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The Comparative Approach theory for real estate valuation

Martin Cupal [a] *

[a]*Masaryk university, Faculty of economics and administration, Lipová 507/41a, Brno, 602 00, Czech republic*

Abstract

Comparative approach is embedded in the International valuation standards (IVS) or also in European valuation standards (EVS) as a main approach to receive a market value of realty. Course this is conditional on the existence of the real estate market, its supply and demand. This paper introduces advanced and detailed procedure against the usual classical procedure of qualified valuers and appraisers. Specifically in the comparative approach procedure were included diagnostic procedures based on statistical approach, mainly because of the type of good that is significantly heterogeneous and inclusion of vector calculus. Main task is to improve the process of selecting the basic sample data into sample set, ie qualitative analysis. It is very necessary, because in the event of poor performance of this step arises incorrect assumption when processing the sample data. This step should be improved by including cluster analysis (CLU), where each entity in the calculation with their variables, ie as a cross-sectional data. Values of each variable and their combination for one observing will indicate the degree of heterogeneity of the observing. Another way could be to use Hotelling T^2 control chart. It also allows qualitative selection of data the basic set. However the paper contains the entire procedure within the comparative approach, the unified methodology that is supported by the model cases.

Keywords: Market value, real estate, comparative approach, statistic tools, multivariate control chart;

1. Introduction

Real estate valuation is always presented as a result of skilled and experienced experts or values, but there is some a priori imperfection relating to subjective assessment and frequent bias of valuation result. It should be more objective and exact as statistical approach can accomplish.

2. Market value and comparative approach by real estates

Comparative approach is embedded in the International valuation standards (IVS) or also in European valuation standards (EVS) as a main approach to receive a market value. Market value is intended by following definition: "*The estimated amount for which the property should exchange on the date of valuation between a willing buyer and a willing seller in an arm's length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion*."

It is easy to find, that the definition gives such type of notion, it cannot be identified with market price. Especially in realty, this property strongly confirms market price and market value are not identity. Market price of realty

* Corresponding Author: Martin Cupal.
E-mail address: martass@mail.muni.cz

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generally is set particular transaction on the date and obviously the place between buyer and seller. Despite a transaction carried out, agreed market price may not correspond to the market value.

Main value's task is to determine market value of certain realty by using suitable methods (approaches) as cost approach (based on building costs), income approach (based on the discounted future cash flows) and comparative approach (based on comparation between similar realties and just valuating realty). Further consider only comparative approach.

Market value set by comparative approach means to use some relevant realty, their market prices are already known. Then market value is created using these realties and their price. Due to meeting the definition (market value), it is necessary to objectify estimation of that. That is the reason, it must be used more realties; using one or two realties is very risky, because its market price can be just affected wrong transaction and price information does drop.

Thus market value set by comparative approach is always estimation and it leads to a quantitative approach, especially statistics. Before the estimation, it is necessary to solve the problem heterogeneous good.

3. Comparative approach – general process of calculating

3.1. General procedure

In the first instance it is necessary to create database of real estates. There are two possibilities. Database "ad hoc" or second one is general database. In the first case a valuer creates the database for particular valuation at a time. In the second a valuer only selects suitable individuals from general database. Of course, general database must be continuously updated. As the sample of similar real estates is created, it gets first market prices (note: it can be also bid prices, but further it must be taken into account). It exists just n prices, because n represents a number of realties in sample set. Let denote it as price vector $\boldsymbol{p}$. Comparative approach the main idea is basically simple. It generally decomposes into two steps. First one means to find a price vector $\boldsymbol{p'}$, that represents qualitative account between similar realties and just valuating realty. It is very important step in real estates valuation due to the problem heterogeneous good. So it is needed to find $\boldsymbol{p} \rightarrow \boldsymbol{p'}$. Second step means only quantitative process, where it gets $\boldsymbol{p'} \rightarrow p''$. Thus p'' represents an unbiased estimation for prices in vector $\boldsymbol{p'}$, then E ($\boldsymbol{p'}$). Real estimation technique will be depending on distribution of market prices.

3.2. Procedure scheme

The following figure displays complete general procedure of comparative approach to obtain required realty market value.

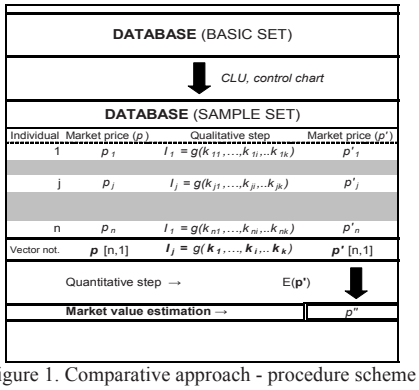

Figure 1. Comparative approach - procedure scheme

4. Comparative approach – qualitative and quantitative steps

4.1. Qualitative (intuitive) step

To find $\boldsymbol{p} \rightarrow \boldsymbol{p'}$ it exists many procedures. The vector dimension remais, so for each p from $\boldsymbol{p}$ it holds: $p' = f(p)$, where f represents transformation function.
This function in essence, must include each relevant variable that has the infuence on price. For a detailed calculation can give some usual techniques, for example $p' = p / I$, where I represents total index of differences. Each particular difference has its own coefficient k_i, that a valuer rates according to his qualification this difference between similar realty and just valuating realty. It holds for each difference. Then $I = g\ (k_1,\ldots,k_i,..k_k)$. Function g may be weighted in the case of qualitative heterogeneous individuals in sample set. Usual forms of function g are Πk_i or geometric mean all coefficient.
It is up to the individual valuer which calculation method he selects. Anyway, the qualitative step ends by finding the vector $\boldsymbol{p'}$.
The qualitative step has less of a problem; it can be heavily influenced by valuer subjective factor unlike quantitative one. Therefore it is necessary trying to objectify this step also, especially in preparing a suitable sample set. Here can help some multivariate statistic methods like cluster analysis or Hotelling T^2 control chart. It should give the unbiased view on sample set, if this is applicable. However, the input data must be credible.

4.2. Quantitative (formal) step

To obtain the final estimation of market value is needed to find $\boldsymbol{p'} \rightarrow p''$. This will be addressed in more detail in chapter 6. In principle, this step means data processing one-dimensional data set (price vector $\boldsymbol{p'}$).

5. Specifics for real estates

5.1. Charakteristic

There is need to distinguish the goods to comparation process. Comparative approach represents highly general method of valuation. Essentially with this approach it's possible to evaluate every goods with existing and functional market. Nevertheless certain goods are more varied than the other. And that is the case of real estates.
In accordance with purpose of this paper, next description will be more formal. Variance as a whole is projected into price, but there exist for each realty particular influences, that have an certain impact on price.
Probably the best way to find out the problem heterogeneous good is to use some statistical diagnostic methods like cluster analysis or Hotelling T^2 control chart. Both of them are able to indicate outliers across multiple variables.

Another realty variables excluding price are location, technical performance and condition, local accessibility, social impacts, accessories, legal constraints and so on. A valuer should be able to ordain and quantify these variables. Only then realty can compare with each other.

5.2. The proof of the heterogeneous good

The following control chart is given to illustrate heterogeneity of real estates across species. There is a noticeable degree of heterogeneity by type of property. All 500 individual realty have been divided to following categories: 1-81 garages, 82-135 cottages, 136-216 flats, 217-284 houses, 285-338 building lands, 339-392 business and administration buildings, 393-446 storage and production buildings and halls, 447-500 restaurants and hotels.

As can be seen, essentially individual realties (traded in large volumes and more frequent intervals) with the more common parameters are far less heterogeneous than rest of species. The number 338 represents the boundary between few and very heterogeneous realties.

A control chart is a data analysis technique for determining if a univariate measurement process has gone out of statistical control. In many cases, there will be more than one measurement process to monitor. One approach to

multivariate measurement processes, say with k measurements, is simply to generate the k individual charts. Basically the Hotelling control chart is a multivariate extension of the chart that does take the correlation into account. The Hotelling T^2 chart is essentially a multivariate generalization of the standard X-bar (and R, S) chart for variables. Instead of controlling single X values or means, and standard deviations, the Hotelling T^2 chart allows for the control of a vector of means for multiple characteristics, and the variance/covariance matrix of the variables to control process variability (in a Generalized Variance Chart). These simple (from a user's perspective) charts can be used to monitor effectively tens of variables (characteristics) simultaneously in a single chart.

6. Quantitative and statistic tools to determine objective estimation

6.1. Data set and statistical data processing

At this stage can be accessed to statistical processing of the vector $\boldsymbol{p'}$. Content difference between $\boldsymbol{p}$ and $\boldsymbol{p'}$ is clear. Particular vector $\boldsymbol{p}$ components represent appropriate market prices of similar real estates to compare. But all vector $\boldsymbol{p'}$ components are (should be) market prices of one just valuating realty. So one individual needs to get one price and that is necessary to use some fitting estimation to obtain p'' from $\boldsymbol{p'}$.

The simplest and often used procedure is decriptive statistics. It can be followed with the box plot. It graphically shows position and variability of vector $\boldsymbol{p'}$, moreover important boundaries. These are usually set robust statistics (more often than moments), thus median (small sqare in the middle), interquartile range (main box 25% quantile - 75% quantile). It depends obviously on the data distribution.

6.2. Simple tests

It would be appropriate to use some one dimensional tests to verificate the data normality or symmetry. It means well known Kolmogorov Smirnov test, Shapiro-Wilk test or Jarque Bera test. With also Grubbs test it is possible to get rid of outliers. After that, the estimation presents classical solution $E(\boldsymbol{p'}) = p''$ up to tested data distibution.

6.3. Multivariate control chart and cluster analysis

Before the task to select suitable $\boldsymbol{p}$ responding observings from sample set, there is need to assess what available observings can be used. To dismiss the influence of valuer subjective factor in this step, it is desirable to use CLU or multivariate control chart. In comparing these two, for the purpose better appears using multivariate control chart, because cluster identification presents weaker objective than direct detection of outlier in the relevant parameters for the real estate valuation. It finally shows unusable individuals for sample set selection.

Conclusion

The issue of comparative approach by real estate valuation still has new possibilities to make some improvement. An inclusion the statistical methods and approaches solve main problem, the subjective view of the expert by the valuation process flow. Compliance of all approaches and steps above can improve many valuation reports.

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